

5.0 PROJECT ALTERNATIVES

This section discusses alternatives considered for the Henrietta Peaker Project (HPP), including the “no project” alternative, alternative site locations for the facility, equipment configuration alternatives, and alternative transmission routes. Project site alternatives were evaluated according to their ability to meet certain key objectives of the project:

- Locate the site near existing gas, water, and transmission lines to minimize offsite environmental impacts
- Locate the project in Kings County where GWF has an existing operating facility
- Locate in an air basin where GWF Energy LLC has existing emission reduction credits (ERCs). (GWF currently holds ERCs in the San Joaquin Valley Air Pollution Control District.)
- Provide an additional, viable source of peak-load electricity to the California energy market on a fast-track development schedule to meet a June 2002 commercial operation date
- Meet the “minor source” definition under federal air quality regulations to qualify for expedited permitting
- Capable of being permitted in a time frame that would meet the June 1, 2002 commercial operation date
- Interconnect at a major substation on North Path 15 that has adequate capacity and provides wide access to the electricity market
- Avoid incompatible or nonconforming land uses
- Conform to the provisions of an existing California Department of Water Resources power purchase agreement with GWF.

5.1 No Project

Recent electricity shortages in California have caught the attention of the nation. It is evident that California needs a more stable and secure supply of electricity for its burgeoning population and industries. Without it, the economy of California will be adversely affected.

The HPP will provide additional, much-needed electricity for the growing California market. Generation from the HPP will assist in stabilizing the California energy supply and price structure. The HPP is being developed in response to the governor's executive orders, which call for expedited development and licensing of power plants to alleviate the state's critical electricity shortage.

The "no project" alternative would not allow for a more efficient use of fuel resources for the production of electricity and would only exacerbate the current electrical shortages.

The electrical power demand in California is expected to increase substantially over the life of the project, and new generation sources will be required to meet this demand. In addition, existing nuclear and aging fossil-fuel plants will likely be retired during the same period. Because the HPP will use a natural-gas-fired combustion turbine generator (CTG) and state-of-the-art emission control technologies, the project will help replace inefficient technologies with an environmentally superior and more efficient peak-load power plant technology. One of the primary goals of deregulation is to encourage the introduction of new, more efficient, and environmentally superior generators to meet power demand. The "no project" alternative does not further this goal.

5.2 Alternative Site Locations

The main factors in selecting a suitable site include compatible land use, appropriate land area, and proximity to existing utilities, such as transmission lines, natural gas pipelines, and water supplies. The proximity to such infrastructure reduces overall plant capital costs, results in fewer environmental impacts, and provides a more economical project. Sites outside of the San Joaquin Valley were not considered, because the ERCs that GWF owns cannot be used effectively in other air basins. Of the major substations located on North Path 15 in Kings County, only the Henrietta Substation has a point of interconnection that would provide adequate capacity for a project in the 100-megawatt (MW) range and that would not require substantial or costly upgrades.

5.2.1 Proposed Site

The proposed site is an approximately 20-acre parcel located in an unincorporated area of Kings County on the eastern side of 25th Avenue. The site is approximately one mile south of State Route (SR) 198 and directly south of and adjacent to the Pacific Gas and Electric Company (PG&E) Henrietta Substation. There are a number of reasons for selecting this site as the preferred location:

- Proximity to transmission interconnect (approximately 550 feet), fuel gas lines (2.2 miles), and service water supply (approximately 16 feet)
- Proximity to existing highways
- Compatible land use

The proposed site is located on a parcel that is properly zoned for the intended use, and the intended use is compatible with the current surrounding land uses.

5.2.2 Applicant's Site Selection Process

In addition to the criteria described above, GWF required at least 10 acres for the HPP and preferred not to acquire a site of more than 40 acres. GWF also limited its search to land available from willing sellers.

Using these criteria, GWF screened two sites in the vicinity of the Henrietta Substation, and a site in Kings County more distant from the Henrietta Substation at a location where GWF is currently developing a power plant.

5.2.2.1 Description and Comparison of Sites

Olivera 1. Olivera 1, the site eventually selected for the HPP, possesses the following characteristics:

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Distance to Transmission	550 feet
Distance to Natural Gas Interconnection	2.2 miles
Distance to Water Supply	16.5 feet
Transportation	Easy access to SR 198, SR 41, and Interstate 5.
Land Use Designation and Neighboring Uses	Compatible with power plant; Williamson Act contract. Neighboring industrial uses include Naval Air Station (NAS) Lemoore evaporation ponds, PG&E Henrietta Substation, and New Star facility.
Permit Processing	No significant impediments to expedited permit processing.
Size / Constructability	20 acres provides sufficient room for the site and potential for expansion. No major construction issues were identified for the site.
Environmental	No significant site-related environmental impacts were identified.

Olivera 2. This alternative site is a 20-acre site two miles east of the proposed site and adjacent to the Avenal Cutoff.

Distance to Transmission	2 miles
Distance to Natural Gas Interconnection	0.25 miles
Distance to Water Supply	2 miles
Transportation	Easy access to SR 198, SR 41, and Interstate 5.
Land Use Designation and Neighboring Uses	Compatible with power plant. Neighboring uses include NAS Lemoore evaporation ponds and agricultural land under Williamson Act contract.
Permit Processing	No significant impediments to expedited permit processing.
Size / Constructability	20 acres provides adequate size to accommodate the proposed project.
Environmental	No significant site-related impacts were identified. However, much more disturbance would result due to the much greater length of linears needed at this site.

GWF Energy LLC Hanford Energy Park Peaker (HEPP) Site. This site is located in the Hanford Industrial Park, approximately two miles south of central Hanford on

Idaho Avenue. The project would be an expansion of approximately 90 MW to the HEPP (approximately 95.5 MW currently under construction).

Distance to Transmission	The distance to the closest point of interconnection is 1.6 miles to a PG&E 115-kilovolt (kV) line; however, the 115-kV line lacks adequate capacity and would require reconductoring 15 miles of existing transmission line to the Henrietta Substation.
Distance to Natural Gas Interconnection	The natural gas line providing service to the HEPP lacks adequate capacity to serve a modified plant. The nearest point of interconnection is Southern California Gas Company Line 800, 13 miles west in the vicinity of the proposed site.
Distance to Water Supply	On site.
Transportation	Easy access to rail, SR 198, and Interstate 5.
Land Use Designation and Neighboring Uses	Zoned industrial. Neighboring uses are industrial and agricultural. No Williamson Act contract.
Permit Processing Size / Constructability	No significant impediments to expedited permit processing. 7 acres provides barely adequate size to accommodate the proposed project.
Environmental	No significant site-related impacts were identified. However, much more disturbance would result due to the much greater length of linears needed at this site.

5.2.2.2 Proposed Site

The Olivera 1 site was selected as the site that best fulfilled project objectives and presented no significant site-related environmental impacts.

5.3 Alternative Project Configurations

The selection of the project configuration for the HPP was based on consideration of the following factors:

- Commercially available turbine types
- Number of required units available on a fast-track delivery schedule to meet the desired electrical output for a June 2002 commercial operation date
- Performance and emission characteristics of the available turbines
- Project economics

- Ability of the emissions control equipment to meet the air quality regulations and qualify as a minor source

The project will consist of two General Electric (GE) LM6000 Sprint CTGs with a total generation capacity of 91.4 MW. Each CTG will generate a nominal 45.7 MW of electrical output for sale under annual average conditions. The CTGs are commercially available technologies that have been widely used in simple-cycle applications.

5.3.1 Combustion Turbine Generator

The basic project configuration was selected based on technical and economical evaluations of cycles capable of meeting the electrical output requirements and complying with air permit limitations and other regulatory requirements. Initial screening studies evaluated various commercially available CTG sizes and technologies. The screening studies considered the CTGs offered by major manufacturers. After reviewing studies to determine power demands in the near future and emission requirements, GWF selected a two-unit configuration to achieve better economies of scale. Final selection of the CTG was based on meeting environmental and economic criteria, and availability to meet the required June 2002 commercial operation date. The CTG model selected was a GE LM6000 Sprint. This model is an aero-derivative machine.

5.3.2 Alternative Fuels

Natural gas is the preferred fuel for the HPP. A major PG&E natural gas supply pipeline crosses the project site, eliminating the need for an additional pipeline. Natural gas is considered the most cost-effective and reliable fuel, and natural gas combustion results in lower air emissions than other fuel alternatives.

Possible alternative fuels for the project include distillate oil, crude oil, produced gas, petroleum coke, coal, and biomass. These alternate fuels are less favorable because they would produce greater air quality impacts than the preferred fuel. Also, both distillate oil and crude oil would require truck transportation or the construction of a new pipeline. For these reasons, natural gas was selected as the sole fuel for the HPP.

5.3.3 Alternative Cycles

Due to time constraints and the immediate demand for power in California, the simple-cycle design was the only viable option. Conversion to a combined-cycle power plant is possible to satisfy any future increase in the demand for power.

In addition to the simple-cycle turbine, several advanced turbine cycles are also available, including the Kalina cycle, the chemically recuperated gas turbine, the humid air turbine, the intercooled steam-recuperated gas turbine, and the steam-injected gas turbine (STIG). With the exception of the STIG cycle, all of these technologies are still in the development stage and are not considered commercial. STIG technology has had mixed commercial success and does not offer the proven longevity and efficiency of currently available advanced turbine technology.

5.3.4 Alternative Water Sources and Technologies

Simple-cycle design does not produce or utilize steam, which eliminates the need for water and for wet and dry condensers, cooling towers, pumps, piping, etc. Water consumption will be limited to the water used in the evaporative cooler, water injection for control of nitrogen oxides (NO_x), power augmentation, and in the water wash system for the CTGs. Westlands Water District and Kings County water was found to be the most suitable water source for this site because of its proximity and because it nearly eliminates the need for a pipeline external to the site. The water quality of this source is satisfactory for the evaporative cooler, so no major water equipment is necessary. Other alternatives were considered (see Section 8.14.2).

5.3.5 Preferred Project Configuration

The preferred configuration for the HPP consists of two gas-fired GE LM6000 Sprint CTGs, each equipped with water injection for NO_x control and power augmentation, and one aqueous-ammonia-type selective catalytic reduction and carbon dioxide oxidation catalyst. The preferred configuration was selected for the following reasons:

- The CTG is a commercially available unit that will efficiently meet the desired electrical output.
- The emission control devices will meet all applicable air quality regulations and achieve minor-source status under federal air quality regulations.
- The chosen configuration is the most economically viable alternative to supply power in the shortest time possible and is available.

5.4 **Alternative Transmission Routes and Interconnections**

Since the interconnect is only 550 feet to the existing Henrietta Substation, no alternative routes were considered.

5.5 **Alternative Natural Gas Interconnection Routes**

GWF considered an alternative natural gas interconnection route. This route would have extended approximately two miles east, traversing land currently in agricultural production and under Williamson Act contract. This route would have required cutting or boring underneath the Avenal Cutoff, a heavily used county road. This route would have also required permanent removal of approximately one-half acre of agricultural land under Williamson Act contract to construct and operate the gas interconnect and isolation valves. To avoid these impacts, GWF chose the proposed natural gas interconnect route.

5.6 **References**

Pacific Gas and Electric Company (PG&E), 2001. *System Impact/Facility Study: GWF Energy LLC, Henrietta Peaking Power Project.*